CDC Kenya

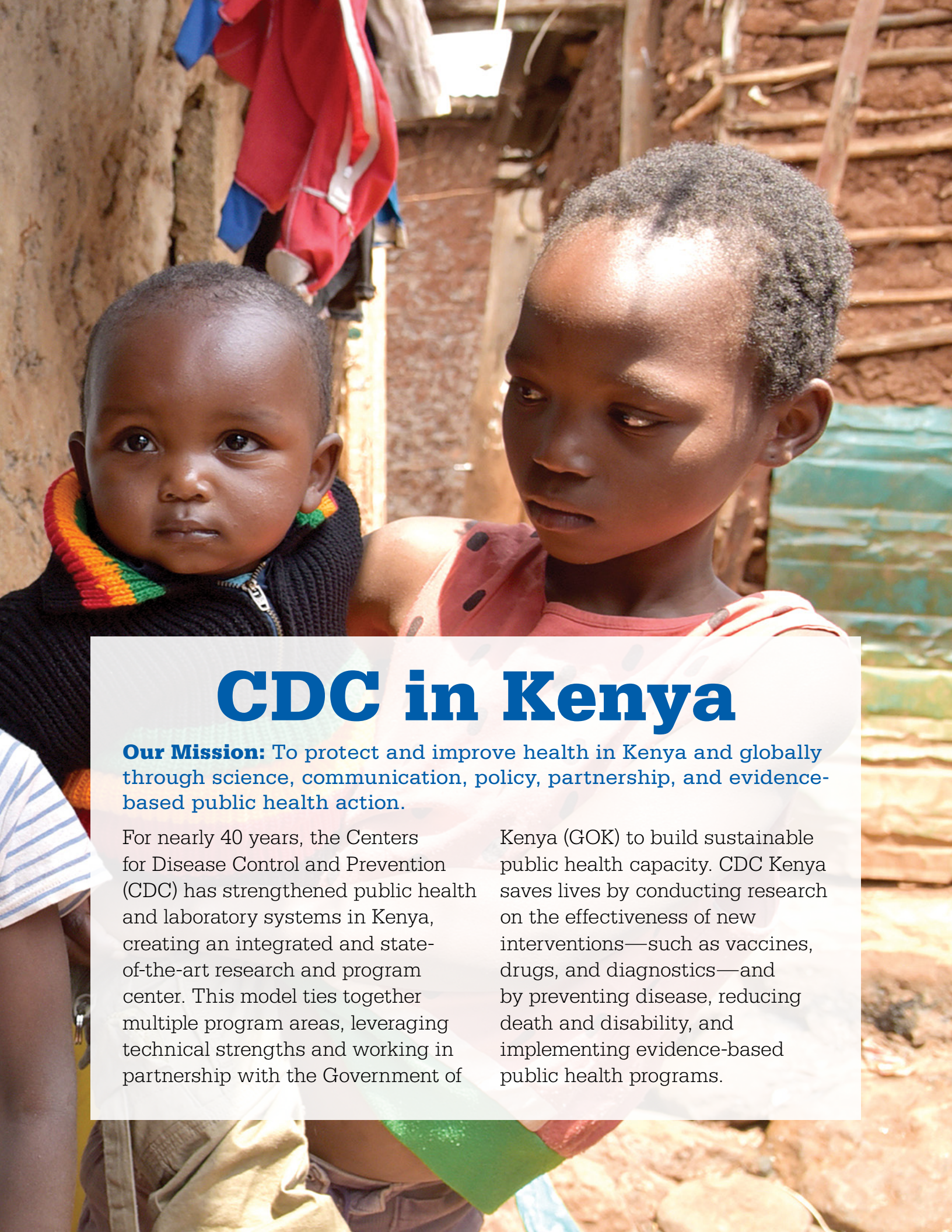
CENTERS FOR DISEASE CONTROL AND PREVENTION • KENYA

Annual Report 2017

Centers for Disease Control and Prevention
Center for Global Health

For accessibility of figures, see Appendix: Explanation of Figures for Accessibility on page 35.

Cover photo: School boys at launch of CHAMPS. Photo on this and next page: Kibera children.



CDC in Kenya

Our Mission: To protect and improve health in Kenya and globally through science, communication, policy, partnership, and evidence-based public health action.

For nearly 40 years, the Centers for Disease Control and Prevention (CDC) has strengthened public health and laboratory systems in Kenya, creating an integrated and state-of-the-art research and program center. This model ties together multiple program areas, leveraging technical strengths and working in partnership with the Government of Kenya (GOK) to build sustainable public health capacity. CDC Kenya saves lives by conducting research on the effectiveness of new interventions—such as vaccines, drugs, and diagnostics—and by preventing disease, reducing death and disability, and implementing evidence-based public health programs.

CDC's **IMPACT** in 2017

684,000 PEOPLE	684,000 people **on life-saving antiretroviral therapy**
328,000 WOMEN	328,000 **pregnant woman** enrolled in antenatal care **now know their HIV status**
150,000 VMMC	150,000 voluntary male medical **circumcisions performed**
57 OUTBREAKS	57 outbreak **investigations** supported
370 SIMS	370 Site Improvement through Monitoring Systems (SIMS) visits conducted **meeting 91% of its annual target**
75 ARTICLES	75 peer-reviewed **scientific articles published**

A Message From CDC Kenya Country Director

Dear Friends and Colleagues,

On behalf of the almost 180 staff working for CDC Kenya, I am pleased to share our 2017 Annual Report. Behind all health events—disease, outbreaks, or interventions—there are human stories, and this year's report focuses more on the human elements of our work. I hope you will find the Report both interesting and motivating.

CDC Kenya continues to conduct work under three broad pillars: HIV/AIDS and tuberculosis (TB) program scale-up; health security; and research. Important issues arose over the course of the year under each thematic area. Concerning HIV/AIDS, satisfaction with the leadership shown by Kenya in diverse aspects of the program was tempered by frustration at not meeting ambitious targets for new diagnoses of HIV and associated initiation of antiretroviral therapy (ART). Recent analyses, however, reveal that there have been substantial declines in the rate of new HIV infections in western Kenya, and that the diagnostic and treatment targets may have been set too high. While these welcome findings indicate that HIV/AIDS programs are having an impact, western Kenya remains the most affected by the pandemic and continued effort is needed to reach all who need life-saving treatment. As in other countries, finding the men and adolescent boys and girls living with HIV remains challenging. Kenya has stood out in its ability to rapidly embrace new HIV interventions and technologies such as use of pre-exposure prophylaxis (PrEP), HIV self-testing, partner notification, and TB preventive therapy (i.e., isoniazid). We sincerely thank all CDC partners whose work has assured that 600,000 persons are taking ART, 45,000 of them children, half of all Kenyans who are on U.S. government supported treatment.

In the health security pillar, with partners such as the Field Epidemiology and Laboratory Training Program (FELTP), CDC Kenya supported 57 outbreak responses including repeated outbreaks of cholera across the country. At least 20 counties reported cholera over the course of the year, with approximately 4,000 cases and over 70 deaths. Cholera prompted activation of the Ministry of Health's Public Health Emergency Operations Center for the first time, which proved to be a useful learning experience. We also partnered with the Ministry of Health and Ministry of Agriculture, Livestock and Fisheries to continue strengthening national capacity and surveillance to prevent, detect and respond to global health threats. Kenya conducted its Joint External Evaluation, an important step to map out future capacity-building efforts. Surveillance on zoonotic infections, influenza and other vaccine preventable diseases, along with regulatory work concerning migration and resettlement of refugees, continued.

The third pillar of CDC Kenya's work is research, for which our main areas of interest are HIV, TB, malaria and vaccine-preventable diseases. CDC Kenya conducts research that does and will impact global health policy and practice. Examples of such enquiry include evaluation of a sporozoite-based malaria vaccine, participation in a multi-center trial of monoclonal antibody infusions for HIV prevention, assessment of the impact of enhanced interventions to combat TB, cohort studies to understand Zika and MERS-CoV risk in Kenya and launch of the CHAMPS study which aims to gain better understanding of causes of death in children. Much of CDC Kenya's contribution to research, both in policy and practice, is further reflected in the list of peer-reviewed publications included at the end of this report.

CDC Kenya could not do its work without strong partnerships. In addition to longstanding collaborations with the Kenya Ministry of Health and the Kenya Medical Research Institute, we have funding agreements with over 40 partner organizations and also receive funding from independent donors. We sincerely thank all partners for their strong and committed work that does so much to make Kenya a safer and healthier country, and will move the country closer to the vision of universal health coverage.

Sincerely,

Kevin M. De Cock, MD, FRCP (UK), DTM&H
CDC Kenya Country Director

Acronyms

ACRONYM	DEFINITION
AESA	Alliance for Accelerating Excellence in Science in Africa
AFI	Acute Febrile Illness
AMP	Antibody-mediated prevention
ART	Antiretroviral Treatment
CHAMPS	Child Health and Mortality Prevention Surveillance
CRH	County Referral Hospital
CTC	Cholera Treatment Center
DaRRE	Detection and Response to Respiratory Events
DGHP	Division of Global Health Protection
DGMQ	Division of Global Migration and Quarantine
DICE	Drop-in Center
EOC	Emergency Operations Center
FAO	Food and Agriculture Organization
FELTP	Field Epidemiology and Laboratory Training Program
FETP-V	Field Epidemiology Training Program for Veterinarians
GOK	Government of Kenya
GPS	Global Positioning System
HPTN	HIV Prevention Trials Network
HVTN	HIV Vaccine Trials Network
iFUND	Innovation Fund
IMPACT	Improving Management for Public Health Action
IRC	International Rescue Committee
ISDS	Immunization and Surveillance Data Specialists
IT	Information Technology
IV	Intravenous
JOOTRH	Jaramogi Oginga Odinga Teaching and Referral Hospital
KABS	Kenya Animal Bio-surveillance System
KPIS	Key Populations Implementation Science
KEMRI	Kenya Medical Research Institute
KLWSS	Kenya Livestock and Wildlife Syndromic Surveillance
MAT	Medication-Assisted Therapy
MERS-CoV	Middle East Respiratory Syndrome coronavirus
MOH	Ministry of Health
PEPFAR	U.S. President's Emergency Plan for AIDS Relief
PHEOC	Public Health Emergency Operations Center
PrEP	Pre-Exposure Prophylaxis
PWID	People Who Inject Drugs
SARI	Severe Acute Respiratory Illness
SHOFCO	Shining Hope for Communities
SIMS	Site Improvement through Monitoring Systems
SLIPTA	Stepwise Laboratory Quality Improvement Process Towards Accreditation
START	Strengthening Technical Assistance for Routine Immunization Training
STI	Sexually Transmitted Infection
STOP	Stop Transmission of Polio
TAC	Taqman Array Card
TB	Tuberculosis
TEPHINET	Training Programs in Epidemiology and Public Health Interventions Network
UNAIDS	Joint United Nations Programme on HIV/AIDS
USRAP	United States Refugee Admissions Program
VMMC	Voluntary Male Medical Circumcision
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WSU	Washington State University

Contents

Science

CDC Kenya uses data to improve programs by conducting relevant research to inform policy and practice in Kenya and globally, monitoring and evaluating activities to ensure cost-effective health impact, and translating research into public health policy and practice.

How Science Impacts Lives—Faith's Story

Faith, a lead peer mentor, provides feedback on the study implementation process during a close-out session. Photo: Alberta Mirambeau

CDC Kenya is widely known for its impact related to science, surveillance, and service, but it is also known for its stories—those of lives impacted and transformed, such as the story of Faith. Faith is a female sex worker whose story begins with one of CDC Kenya's cornerstone activities—science. In 2013, CDC Kenya, in collaboration with the Ministry of Health, implementing partners, and other U.S. government agencies, launched the Key Populations Implementation Science (KPIS) study. The KPIS study aimed to evaluate oral self-testing among female sex workers and determine the optimum ratio between peer educators and female sex workers for increasing the uptake of HIV testing and follow-up.

Faith, a native of Nairobi, is a 45 year-old single mother of one. She used to work in banking and is currently the lead peer educator at the Pumwani Drop-in-Center (DICE), a CDC-supported site serving more than 7,000 active female sex workers. In 2010, Faith was laid off and found herself desperate to provide for her son's education and basic needs. It was at this time that she began soliciting clients online. "Doing sex work was not my first choice," states Faith as she explains the risks faced with each encounter.

Despite the challenges faced in this line of work, Faith found an opportunity to serve her community and empower other women like her. While receiving HIV testing and prevention supplies from Pumwani DICE, she discovered that she was a natural leader and could connect with other female sex workers. As the lead peer educator for the KPIS study at the Pumwani site, she helped recruit more than 500 women.

Faith speaks confidently about the study's positive impact on her life and how she now easily describes how studies are conducted, how to positively engage with people, how to obtain voluntary consent and sensitive personal information, and the critical role of participants in public health studies.

Although Faith continues to be a female sex worker, she aspires to pursue a degree in business and return to banking. Faith credits the other peer educators for the site's high recruitment of study participants and simply states, "it's because of them" and the fact that they "have accepted themselves."

Leading a Robust Evaluation of the Impact of RTS,S Malaria Vaccine in Kenya

Globally, Africa bears the greatest burden of malaria. Since 2000, malaria control efforts have led to a 62 percent reduction in deaths. Despite this achievement, an estimated 445,000 people died from malaria in 2016, the majority of them young African children. New tools are needed to fight the disease.

WHO published its first position statement for the RTS,S malaria vaccine based upon the findings of the phase III clinical trials conducted at 11 sites, including a site in Kenya that was led by the CDC and the Kenya Medical Research Institute (KEMRI) collaboration. WHO first recommended a pilot program in distinct settings in sub-Saharan Africa- this represents the largest implementation of a malaria vaccine in history. The vaccine will be evaluated in 720,000 children aged 5-17 months in Ghana, Malawi, and Kenya.

The goal of the RTS,S pilot is to generate evidence on the feasibility, safety, and efficacy to inform WHO's future policy recommendation on the expanded use of the vaccine among children in sub-Saharan Africa. The vaccine will be delivered in Kenya through the routine immunization program under the supervision of the Ministry of Health and in collaboration with the National Malaria Control Program.

RTS,S could prove to be a powerful tool in building upon the gains made over the past decade. In addition to saving tens of thousands of lives in Africa, RTS,S has the potential to:

- reduce the healthcare associated costs of managing malaria patients.
- end the emerging problem of drug resistance and the need for insecticides used to kill mosquitos.

The RTS,S pilot is a major milestone for vaccine research and may pave the way for future generations living healthier lives free from malaria in Kenya and around the world.

Children in western Kenya, like the one seen here, may receive the RTS,S vaccine. Photo: Sven Torfinn / WHO 2016.

Large Clinical Trial of Broadly Neutralizing, HIV Prevention Antibodies Launched

HIV vaccine research has had its share of difficulties. However, a new trial making its debut in sub-Saharan Africa may lead to a breakthrough. The National Institutes of Health's antibody-mediated prevention (AMP) study, also known as HIV Vaccine Trials Network (HVTN) 703/ HIV Prevention Trials Network (HPTN) 081, could impact the future of HIV prevention and inform vaccine research. In Kenya, CDC In Kenya, CDC is conducting the trial from the KEMRI Clinical Research Centre in Kisumu County is conducting the trial from the KEMRI Clinical Research Center in Kisumu County.

Enrollment of the intravenously (IV) delivered antibody in adults at risk for HIV infection began in January 2017 when 600 women were initially pre-screened. Following this, 150 of the women went through to the screening process and 61 were selected and enrolled in the study. The study is expected to take 5 years and each participant will be in the study for about 2 years.

In traditional vaccine studies, people get a vaccine and researchers wait to see if they produce antibodies in response. In the AMP Study, participants receive the antibody directly by IV infusion. Laboratory studies have shown that the antibody used in this study (VRC01) stops up to 90 percent of HIV strains, and thus it is considered a broadly neutralizing antibody.

The multi-national AMP Study recruits women in sub-Saharan Africa because they are among those at highest risk for HIV infection and have greatest need for prevention measures. To join the study, a woman must be healthy, between the ages of 18 and 40, and HIV negative. She cannot be pregnant or breastfeeding.

Study volunteers randomly receive either a higher dose of the antibody, a lower dose, or a placebo. Neither the volunteers, nor the investigators, know who receives which type of infusion during the study. The volunteers receive a total of 10 infusions, once every 8 weeks, and they are then followed for an additional 20 weeks. They also receive standard prevention interventions including oral pre-exposure prophylaxis (PrEP). The trials will examine the safety, tolerability and effectiveness of the antibody infusion. Trial results are expected in 2022.

Many scientists believe that a vaccine developed using broadly neutralizing antibodies could protect healthy people from HIV infection. The AMP Studies are contributing to the assessment of this hypothesis. Additionally, the studies aim to clarify what level of broadly neutralizing antibodies a vaccine, or other long-acting HIV prevention method, needs to achieve and maintain for long-term protection from HIV.

Champs Launches to Get to the Root of Child Deaths in Western Kenya

Children from Magadi Primary School in Kisumu, Kenya live in the surveillance area covered by CHAMPS. Photo: Justin Williams

On May 5, 2017, the U.S. Ambassador to Kenya Robert F. Godec, CDC Kenya and partner organizations stood on the grounds of Magadi Primary School to launch the Child Health and Mortality Prevention Surveillance (CHAMPS) project in Kisumu and Siaya counties in western Kenya. CHAMPS is a collaboration between the Bill and Melinda Gates Foundation, Emory University, the Henry Jackson Foundation, KEMRI and CDC. CHAMPS aims to increase understanding of how, where, and why children are getting sick and dying by determining a cause of death, through minimally invasive tissue sampling, review of medical records and social factors, for each child under five years who dies within the surveillance communities. Through an emphasis on rapid "data to action" these results will enable scientists and public health leaders in Kenya and around the world to take practical, meaningful steps to reduce child mortality. CHAMPS is a 20 year, long-term program that will ultimately take place in as many as 20 sites with high childhood mortality rates (>50 deaths in children under five years of age per 1,000 live births) throughout South Asia and sub-Saharan Africa. The program began in six sites including Kenya; Bangladesh; Ethiopia; Mali; Mozambique; and South Africa. During the launch, Ambassador Godec applauded the community health volunteers who are the eyes and ears on the ground and the ones who meet face-to-face with the families who have lost young children, observing, "You are heroes in our communities."

Kenya Disease Detective Wins $100,000 Grant to Help Pregnant Women in Rural North

In 2017, Dahabo Adi Galgalo, a second year resident of the Kenya Field Epidemiology and Laboratory Training Program (FELTP) won a $100,000 Innovation Award from the Alliance for Accelerating Excellence in Science in Africa (AESA). The award, supported by the Bill and Melinda Gates Foundation, was for the design of a wearable global positioning system (GPS) device to track expectant mothers and ensure they seek health care for themselves and their infants. The goal of the project was to decrease maternal and infant deaths among pastoralists on the Kenya-Ethiopia border.

Born into a pastoralist family, Dahabo Adi Galgalo, always wanted to improve the health of families in the Kenya-Ethiopia border whose livelihoods depend on raising and selling livestock. "The area of the pastoral community is so vast. The hospitals and health workers are very few. In fact, Marsabit County is among the top counties in Kenya in maternal and infant death," she explained.

Example of the GPS device used to track expectant mothers and ensure they seek health care for themselves and their infants. Photo: Justin Williams

A contributing factor to the high mortality, Dahabo believes, is a lack of antenatal care for pregnant women. Antenatal care clinics are few and far between in Marsabit County, and pregnant women have to travel long distances to reach existing facilities.

Dahabo is currently enrolled in the two-year FELTP advanced level program, which results in a Master's Degree from Moi University upon completion. Prior to this, she was a graduate of the three month FELTP "Frontline" program and also completed the FELTP six month Intermediate course. In 2015, Dahabo led a study that followed mothers who gave birth at a regional hospital. Of the 1,042 mothers who delivered during the one-year period, 116 lost their babies during delivery. Of those women, 40% had never visited an antenatal care clinic. Those who did visit clinics often traveled between 50 and 80 kilometers.

"That is when I had the idea of going mobile," Dahabo said.

As part of the study, expectant mothers received the device to help health care workers track them, send reminders on proper antenatal care, and arrange visits to a doctor or healthcare volunteer. The solar-powered device—which Dahabo helped design—is the size of a coin, and designed to be worn on a bracelet.

"With this, we can track the expectant mothers wherever they are and provide advice and treatment," she said.

Centered at the Moyale Regional Hospital, the program aims to cover the majority of Marsabit County and reach 200 expectant mothers over an initial period of two years. Program staff will follow expectant mothers for nine months and follow their children through their full immunization cycle.

Staff Reflections…

Wanja Wamugunda—CDC Kenya Research Assistant

"What motivates me is working with a diverse team of scientists passionate about responding to local health concerns as well as emerging health risks through outbreak response, research and capacity-building.

My goal is to be a resource for both scientific and programmatic staff, providing the support required to ensure all projects adhere to CDC regulations by obtaining the appropriate approvals both locally and at CDC, whilst also ensuring the dissemination of scientific output through presentation of abstracts and publication of manuscripts is done following CDC clearance procedures and guidelines."

Wanja was awarded the CDC Kenya Power of One Quarterly Award in April 2017 for her **'Tireless efforts to ensure that DGHP scientific work is well documented, conducted ethically, and shared through presentations and publications.'**

Behind the Scenes (and Science)— The Science and Ethics Team

CDC's role in public health is anchored in sharing evidence-based science—science that emerges from surveillance and research. However, before anything is published and made available to the public, there are rigorous procedures in place to ensure that it is sound, credible, and ethical. CDC requires that anyone involved in data collection activities comply with statutes and regulations for research or public health practice. For CDC Kenya's HIV and tuberculosis activities, there is a team to ensure adherence to clearance procedures and processes and that the scientific credibility of CDC is maintained—the Science and Ethics Team (SET).

SET's role is not limited to activities involving CDC staff, but includes any scientific activity undertaken by the 35 funded implementing partners. SET is the focal point of communication between implementing partners, CDC Kenya and CDC headquarters in Atlanta. The team also assists in providing guidance and direction on the development, submission, review and clearance of scientific protocols; and conducting trainings to keep staff abreast on new guidelines and procedures. CDC-funded products cleared through SET include manuscripts, abstracts, reports, and fact sheets among others. Additionally, SET plays an instrumental role during the technical reviews of funding applications.

Despite operating as a small team, SET reviewed and processed over:

- 40 scientific protocols,
- 100 abstracts,
- 30 manuscripts, and
- 25 international conference presentations.

SET team members are detail-oriented, responsive to ongoing requests, collaborative and systematic—making them highly efficient. Without SET, scientific innovations and findings from CDC Kenya wouldn't have the reach and impact of informing global public health. Although behind the scenes, SET is key to promoting high quality scientific information and ensuring the delivery of CDC Kenya's science.

SET (from left to right)—Miranda Barasa, Dr. Cathy Ruto (Team Lead), and Stella Njuguna.
Photo: Alberta Mirambeau

Surveillance

CDC Kenya supports the development and implementation of population and facility-based disease surveillance systems that provide for data collection, analysis, and reporting in order to assess the disease burden in communities, identify outbreaks, guide public health action and evaluate the impact of health interventions.

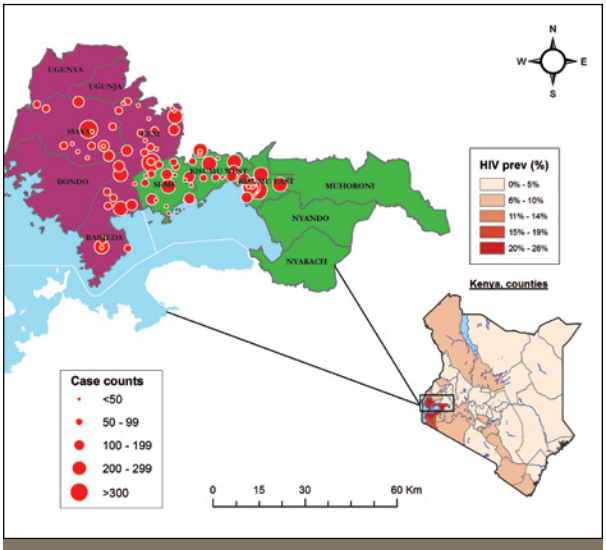
CDC Kenya Tests Efficient Method for Uniquely Identifying HIV Cases

Following the launch of the UNAIDS 90-90-90 targets,[1] it became clear that accurate and efficient surveillance methods are needed to monitor Kenya's progress towards meeting those goals. HIV case-based surveillance (CBS) is more accurate than aggregate reporting in tracking these targets. In the absence of a lifelong unique personal identifier, as is the case in Kenya, there are various methods to accurately identify unique HIV cases.

Generally, data managers link records when the name or an identifying number for a patient is exactly the same in two (or more) records. This linkage is likely when a person is tested in one clinic and starts treatment in another location. This traditional approach is referred to as "deterministic" matching. However, this method is often cumbersome without the unique identifier and not feasible for large datasets, such as the thousands of HIV patients in Kenya. Another approach is to link records using partial matching of names, numbers, demographics or location, using computer-based analysis of the "best possible" match (referred to as "probabilistic" matching); and then evaluating the accuracy of the process to accept or reject the match. This better accounts for differences in spelling, nicknames, name order, etc. The "best possible" method, or probabilistic matching, which was tested in Kenya, may offer a solution for large datasets.

CDC Kenya epidemiologists, in collaboration with other partners (University of California San Francisco, National AIDS and STI Control Program and KEMRI), led a pilot project to implement CBS in western Kenya, which compared the feasibility and accuracy of the traditional approach (or deterministic method) and the "best possible" approach. In this pilot, the "best possible" method performed better than the traditional approach. The epidemiologists estimated that at least 5% of cases are over-reported due to not accounting for duplicated cases. Determining the percentage of duplicates also helps ensure the accuracy of setting estimates and projection models. The results from this study suggested that the "best possible" name matching method best meets the needs for CBS in Kenya, especially in the absence of a unique identifier. Given the new information revealed from this study, the findings were presented at the International AIDS Society Meeting in Paris in July 2017.

This type of study is a necessary contribution to surveillance efforts in Kenya to monitor the country's progress towards meeting the UNAIDS targets.



HIV CBS pilot data from 124 facilities in two high HIV-burden counties in Western Kenya

[1] 90% of all people living with HIV (PLHIV) will know their HIV status, 90% of all people with diagnosed HIV will receive sustained anti-retroviral treatment (ART) and 90% of all people receiving ART will achieve viral suppression. Retrieved from UNAIDS. 2018. http://www.unaids.org/en/resources/documents/2017/90-90-90.

Innovative Tracking of Zoonotic Diseases

Given the recent experiences of rapidly spreading global outbreaks across borders and continents, an effective surveillance system for zoonotic diseases, which account for 60% of emerging diseases, must quickly detect and report disease events in human and animal populations to trigger timely investigation and response. Examples of such diseases include Rift Valley Fever, Middle East Respiratory Syndrome (MERS), rabies, brucellosis and highly pathogenic influenza. The animal health surveillance system in Kenya lacks a tool for real-time disease reporting. To address this, CDC Kenya in collaboration with the Kenya Directorate of Veterinary Services and the Kenya Wildlife Service, through the Global Health Security Agenda, launched the Kenya Livestock and Wildlife Syndromic Surveillance (KLWSS) system—a near real-time electronic surveillance and reporting system developed by Washington State University (WSU). In this system, field surveillance officers submit data via a mobile application and the data are made available to county and national authorities through a central server. Data collected by the application, called the Kenya Animal Biosurveillance System (KABS), are presented on a web-based dashboard with automated data analysis and feedback. KABS reports on nine syndromes (abortion, sudden death, hemorrhagic, neurologic, respiratory, gastro-intestinal, cutaneous, animal bites and oral/foot lesions) in seven livestock species (cattle, sheep, goats, chicken, camels, dogs, and cats) whereas the KABS-Wildlife form reports the same syndromes in five animal categories (herbivores, carnivores, avian, aquatic, and non-human primates). County surveillance officers including veterinarians and wildlife officers in Nakuru, Siaya, and Makueni counties were trained and downloaded the app.

In July 2017, following the launch of the new system, a Nakuru-based surveillance officer used KABS to report sudden animal deaths suspected to be anthrax—two cows died within a 100-meter radius, and a male adult buffalo was found dead at a nearby national park in an area where anthrax has been reported in the past. An outbreak investigation team was deployed to characterize the event epidemiologically, collect ecological data and advise public health officials on intervention measures. The case was later confirmed as anthrax. The team recommended that Nakuru County animal health officials continue to conduct routine vaccination of livestock and educate farmers on safe handling and disposal of dead animals to prevent human infection.

Eventually, KLWSS and the KABS application will be rolled out across Kenya and field surveillance officers and public health officials will have the right tools to prevent, detect and respond to animal diseases outbreaks at their source.

New Surveillance System Improves Migration and Resettlement Process

Every year, about 50,000 refugees resettle to the United States under the United States Refugee Admissions Program (USRAP). The resettlement process involves U.S government agencies including the Department of Homeland Security, the Department of State and CDC. CDC, through the Division of Global Migration and Quarantine (DGMQ), has the oversight role on the medical assessment of USRAP participants. Screening and treatment before entry into the U.S. are required for some of these diseases. These activities prevent the importation of infectious diseases, particularly tuberculosis and vaccine-preventable diseases.

Five days prior to departure, refugees go through pre–departure surveillance in transit centers to identify and treat any conditions that might have been missed during the initial medical screening. Pre-departure surveillance in transit centers was introduced following interruption of departures for U.S.-bound refugees residing in Kenya due to infectious diseases such as cholera, measles and chickenpox. The system initially piloted in Kenya was paper based and meant data were inconsistently collected and rarely analyzed to enable timely action. This often resulted in travel delays for these refugees until their health condition was resolved and the possibility of transmission of disease to other refugees was not considered a risk.

To improve pre-departure surveillance, CDC Kenya's DGMQ in collaboration with the International Organization for Migration (IOM) designed and implemented an electronic surveillance system that integrates all the migrant/refugee health information at the Nairobi Transit Centre. The improved surveillance system resulted in timely detection and response to cases of infectious diseases among USRAP participants prior to departure for the US. The number of refugees who had their travel deferred due to chickenpox (varicella) reduced from 15 in 2016 to 6 in 2017 and those due to other acute medical conditions reduced from 42 in 2016 to 27 in 2017. The new system also reduced interruptions in resettlement of USRAP participants residing in Kenya with 5,275 refugees being resettled without any delays between October 2016 and August 2017. The improved surveillance also led to a decision by IOM to introduce vaccination for varicella as part of the USRAP vaccination program and to develop a 'Best practices at transit centers" guidance note on promoting health and safety at transit centers.

IOM Transit Center in Nairobi, Kenya.
Photo: Justin Williams

Strengthening Antimicrobial Resistance Surveillance

Antibiotic resistance (AMR) is one of the most significant global public health problems and is rising in many countries due to over-use of antibiotics, widespread availability of counterfeit or substandard medicines and poor infection prevention and control measures. Research shows that a continued rise in AMR could lead to 10 million deaths every year and a 3% reduction in gross domestic product by the year 2050.

Kenya has joined the global campaign against AMR in an urgent move to find sustainable measures to reduce further emergence and spread.

To combat the growing threat of AMR, The Kenya MOH is developing a national surveillance system to detect resistant organisms. Data from the surveillance system will be used to update treatment guidelines and promote additional research on AMR. Kenya will also contribute to international AMR surveillance efforts by submitting data to the WHO Global Antimicrobial Resistance Surveillance System (GLASS).

In 2017, CDC and the National Public Health Laboratory Services (NPHLS) piloted the AMR surveillance system and assessed infection prevention and control (IPC) practices at two public hospitals in Thika and Kitale counties. Although basic laboratory equipment and laboratory information systems were in place, the assessment showed that testing and reporting capacities needed to be strengthened. NPHLS developed work plans to improve these capacities and partners are currently assisting with the improvements. This includes training laboratory staff in microbiology testing methods, providing necessary laboratory reagents, and updating information systems. Data from the pilot sites were reported to NPHLS. Moving forward, the AMR surveillance system will be revised to incorporate lessons learned from the pilot sites. Over the next five years, the program will expand to other major facilities in Kenya.

Emergency Operations and Workforce Development Programs Impact National Cholera Response

In 2017, Kenya experienced a surge in cholera cases across the country, including urban outbreaks in the capital city, Nairobi. A total of 3,967 cases including 76 deaths were reported across 20 of 47 counties (43%) in the country. By the end of the year, seven counties continued to have active cholera outbreaks. Although Kenya experiences cholera outbreaks every year, 2017 included a number of point source outbreaks in affluent sections of Nairobi, including at a wedding, a high-end hotel and at a large conference. As the number of reported cholera cases increased substantially, the Government of Kenya (GOK) established a national task force to coordinate response activities. CDC Kenya was one of many partner agencies who provided technical support. The Kenya MOH developed a national response plan to scale-up response activities such as surveillance, case management, and social mobilization. The GOK also initiated strict food hygiene standards and promoted safe food handling requirements in addition to scaling-up of water, sanitation, and hygiene (WASH) activities.

Following guidance from CDC Kenya and WHO, the MOH activated the Public Health Emergency Operating Centre (PHEOC) for the first time and identified an Incident Manager to coordinate the response. FELTP residents were assigned to the PHEOC where they updated line lists, analyzed data, developed situation reports, called contacts and other persons of interest and were part of rapid response teams. In Nairobi, FELTP residents were also placed at the four main cholera treatment centers (CTCs) where they provided epidemiological support and served as a link between the PHEOC and the CTCs. The residents also participated in other specific investigations including:

- Case control study in Nairobi,
- Investigation of the cholera outbreak at a health conference, a nursing school and among police officers in Nairobi,
- Knowledge, attitudes and practice study among health workers and community members in four sub-counties in Nairobi, and
- Outbreak investigation in Siaya County in western Kenya.

Measures to end the outbreaks are ongoing across the country, including timely case management in cholera treatment centers and key public health communication messages.

Improving Detection and Response to Respiratory Events in Kenya

The Detection and Response to Respiratory Events (DaRRE) project aims to identify cases of respiratory illness that could lead to outbreaks early enough in order to put prevention and control measures in place.

DaRRE has four main objectives:

- Strengthening and expanding existent surveillance platforms to detect and monitor a broad range of respiratory threats,
- Improving the completeness and timeliness of respiratory event-based reporting by community health volunteers, clinicians and health officials,
- Increasing laboratory capacity, including speed and accuracy, with an expanded list of pathogens tested at local and national levels, and
- Improving the response to respiratory outbreaks through epidemiologic investigations and appropriate implementation of control measures.

CDC Kenya, through the Global Health Security Agenda, supports the Ministry of Health in strengthening sentinel surveillance for acute febrile illness and respiratory disease. The latter is done largely through Severe Acute Respiratory Illness (SARI) surveillance based on referral hospitals across the country. CDC Kenya is also improving laboratory capacity for influenza and other respiratory viruses of public health importance at the National Influenza Center, part of the Public Health Laboratory System.

In 2017, the DaRRE team trained physicians and surveillance officers on respiratory illnesses of public health importance, including ,including influenza and Middle East Respiratory Syndrome Virus. DaRRE also added Marsabit County in northern Kenya as a SARI sentinel surveillance site. Marsabit County is mostly inaccessible and the population is largely nomadic. Previous research also indicates that the large population of camels in the region carries antibodies for Middle East Respiratory Syndrome Virus.

Expanded HIV Testing Eligibility Increases Detection of HIV Infections

Three counties in western Kenya with the highest HIV burden (Homa Bay, Siaya, and Kisumu) have struggled with identifying new HIV infections. To increase HIV testing services and the detection of HIV infections, 7 high-volume health facilities in western Kenya expanded HIV testing eligibility to now include clients who reported having a negative HIV test:

- In the past 3 to 12 months, or
- In the past 3 months or less if the negative test could not be verified by available health records.

These criteria expand the Kenya MOH guideline, which recommends annual HIV testing for the general population. CDC Kenya conducted a study to determine if the expanded eligibility criteria lead to increased detection of HIV infections.

Data collected and analyzed by CDC Kenya from PEPFAR-supported testing facilities between March and July 2017 showed that of the 68,513 clients who received an HIV test, 740 (1.1%) had a HIV positive test result. Although the rate of positive tests was twice as high among those meeting MOH guidelines versus those meeting expanded criteria (1.9% vs. 0.8%), more than half of all infections were found among clients meeting the expanded criteria—individuals who normally would be ineligible under the current guidelines. The results of this study suggest that expanding HIV testing eligibility (i.e., to include clients tested in the past 3–12 months) in high HIV-burden areas could increase access to HIV testing services and timely diagnosis, and accelerate epidemic control. The findings of this analysis was presented at the international 2018 Conference on Retroviruses and Opportunistic Infections and represents CDC Kenya's continued efforts to identify new ways to intervene effectively.

Staff Reflections…

Nora Macklin—Project Officer

"It is a great honor to work at CDC Kenya, but my time here is limited! Therefore, I am particularly motivated to work directly with the host country, in order to have a long lasting impact on the health of Kenyans.

In my government to government work, my vision is to develop and implement strategies for institutional development, creating opportunities for long term success in Kenya".

Nora was awarded the CDC Kenya Power of One Quarterly Award in November 2017 for her **'Tireless effort towards strengthening external partnerships and enhancing internal cohesiveness, inclusivity and celebrating diversity at CDC Kenya'.**

Service

Service stands as a core tenet of CDC's priority activities through the delivery and implementation of life-saving interventions for the most vulnerable populations. Through service delivery, CDC seeks to accelerate progress toward a world safe from disease threats and where lives are saved and health is improved.

Delivery of High Quality Care—The SIMS Story

To ensure our HIV and TB implementing partners deliver high quality HIV services, PEPFAR developed the Site Improvement through Monitoring System (SIMS). Delivered through a standardized tool, SIMS site visits consist of a rapid assessment of services provided at CDC-funded health facilities. Using a 4-color scoring criteria (red, yellow, light green and dark green), SIMS visits examine core components of service delivery for HIV-infected patients. Through the efforts of SIMS, CDC Kenya is better positioned to:

- Make necessary shifts to inform the country operational plan,
- Monitor service delivery sites in all program areas,
- Use data and quality-assurance outcomes to improve services, and
- Recognize successes and share best practices among partners.

In addition to the benefits offered to CDC Kenya and its ability to support HIV programs, SIMS has also led to tangible and sustainable changes that positively affect facilities' delivery of care. Some examples of substantive changes include:

Physical modifications in sites' systems. One specific example of positive change can be observed in the improvements made to sites' waste disposal system. SIMS visits revealed that biomedical waste was often deposited in a large pit on the facility grounds. Due to feedback received from SIMS visits and with support from implementing partners, sites developed proper waste disposal systems including the installation of incinerators. This not only met national standards, but created a safer environment for staff, patients and the surrounding community.

Staff adherence to guidelines. SIMS is always seeking to be in lock-step with the evolving changes made to standards of care. Chart reviews, for example, gauge the extent to which the provision of care meets the latest guidelines. On-the-spot training is offered to facility staff when current treatment protocols are not reflected in patient records, leading to increased adherence to guidelines by service providers.

County government engagement. CDC's implementing partners are also charged with helping county government strengthen their capacity to eventually take on the lead role of supporting HIV facility services. SIMS creates a forum for ensuring that county engagement with CDC partners is ongoing, reflective of joint planning and leading to a period of transition from CDC-supported sites to county-supported sites.

As a constructive and systematic process, SIMS forms a platform for strengthening both human resources and the delivery of standardized guidance to address gaps. CDC Kenya is contributing to not only the provision of care, but the processes that lead to sustainable health systems strengthening.

Offering Hope and Prevention—Medication-Assisted Therapy in Western Kenya

In 2017, CDC Kenya, along with key partners, celebrated the opening of the Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) Wellness Center. The Wellness Center is one of six clinics in Kenya authorized to provide medication-assisted therapy (MAT) to people who inject drugs (PWID). MAT clinics use prescribed opioid medication (e.g. methadone), under medical supervision as a substitute for intravenous heroin. The use of methadone reduces the severity of withdrawal symptoms and increases the likelihood of a successful recovery.

Injection drug use contributes significantly to HIV transmission globally. HIV prevalence among PWID in Kenya is 18.3% and there are an estimated 1,000 PWIDs in the Nyanza region of western Kenya, an area where public health officials ramped up prevention efforts due to the high HIV prevalence rate. Through PEPFAR and its implementing partners, CDC Kenya remains committed to meeting the needs of this vulnerable group.

The Wellness Center offers a range of services for PWID, including screening, prevention and treatment of diseases like HIV, TB, and hepatitis B and sexually transmitted infections. The Wellness Center provides psychosocial support in the form of individual, group and family therapy. With the opening of the Wellness Center, individuals from the six counties making up the Nyanza region (Homa Bay, Migori, Kisii, Siaya, Kisumu, and Nyamira) now have access to life-saving services.

The Wellness Center has successfully helped many of its clients re-unite with their families and re-integrate back into society. Through the services offered by the Wellness Center, clients are not only improving their health, but also experiencing a sense of restored hope and promise. The opening of the Wellness Center demonstrates a continued vision by CDC Kenya and its partners to stay the course towards eliminating HIV and signals a continued commitment to improving health and saving lives.

Putting Science into Action—Active TB Case Finding in the Prison Setting

An inmate peer educators meeting in Kamiti prison to discuss HIV and TB co-infection, led by a uniformed HIV Testing Services officer. Photo by a member of the Health Strat team.

Kenya celebrated World TB Day on March 24, 2017 by releasing results from the National TB Prevalence Survey. The report revealed that there are more TB cases in Kenya than previously estimated with a TB prevalence of 558 per 100,000 people and approximately one-half of all persons with TB in Kenya are "missed"—meaning that they are not diagnosed and treated in a timely manner.[2] As one form of addressing the need in treating and controlling TB, in 2017, CDC Kenya, through PEPFAR support and implementing partners, initiated 98% of patients

[2] Kenya National Tuberculosis, Leprosy, and Lung Disease Program. March 2017. Kenya TB Prevalence Survey 2016. Available at https://www.nltp.co.ke/#

with TB and HIV co-infection on anti-retroviral therapy. However, the findings from the Kenya TB survey raise concern on the increasing need for active case finding—an activity underway in various Kenyan settings, including prisons.

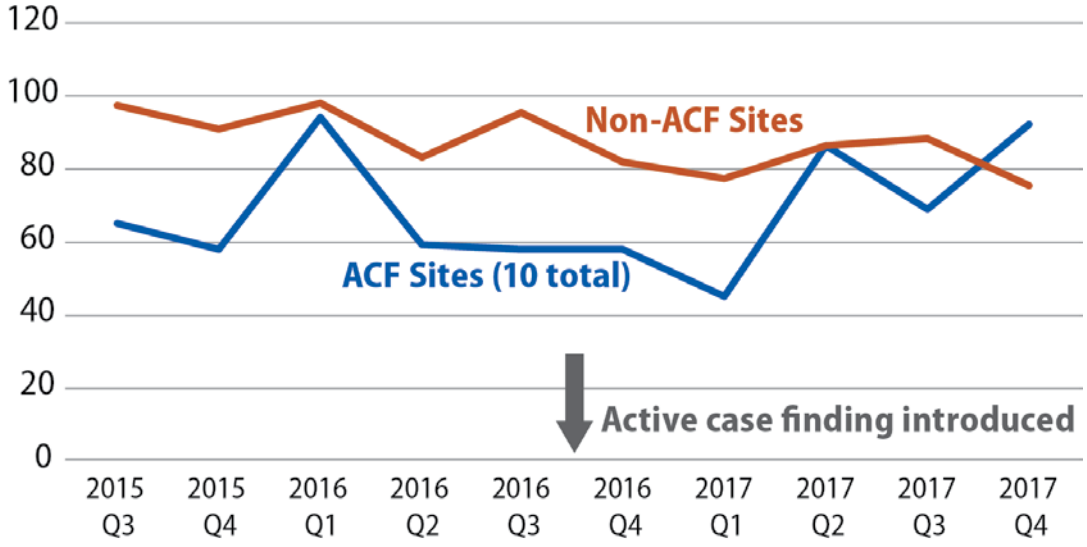
For over a decade, CDC Kenya has worked with Kenyan prisons to strengthen disease prevention and treatment. CDC's role with the prison system began with establishment of the TB screening program, but has evolved to include comprehensive health screenings and care. In early 2017, CDC Kenya in partnership with Health Strat and the National Kenya Prison System launched a pilot program in 10 high-volume prisons to actively identify TB cases. Prior to the pilot, TB cases were generally identified when new inmates entered the system or during quarterly screenings. This form of periodic screening was expensive, interfered with prison processes, and missed some TB cases.

The pilot project appoints a TB champion, who is an inmate trained to identify TB symptoms. The TB champion escorts inmates who are coughing or showing other symptoms to the clinic for evaluation by a trained health care worker. Once inmates are diagnosed they are put on care, administered medication under the direct observation of a healthcare worker and offered psychosocial support. The TB champion also leads contact tracing to help identify other inmates who may have been exposed. These contacts are assessed by a health care worker for possible TB infection. This model of TB case finding:

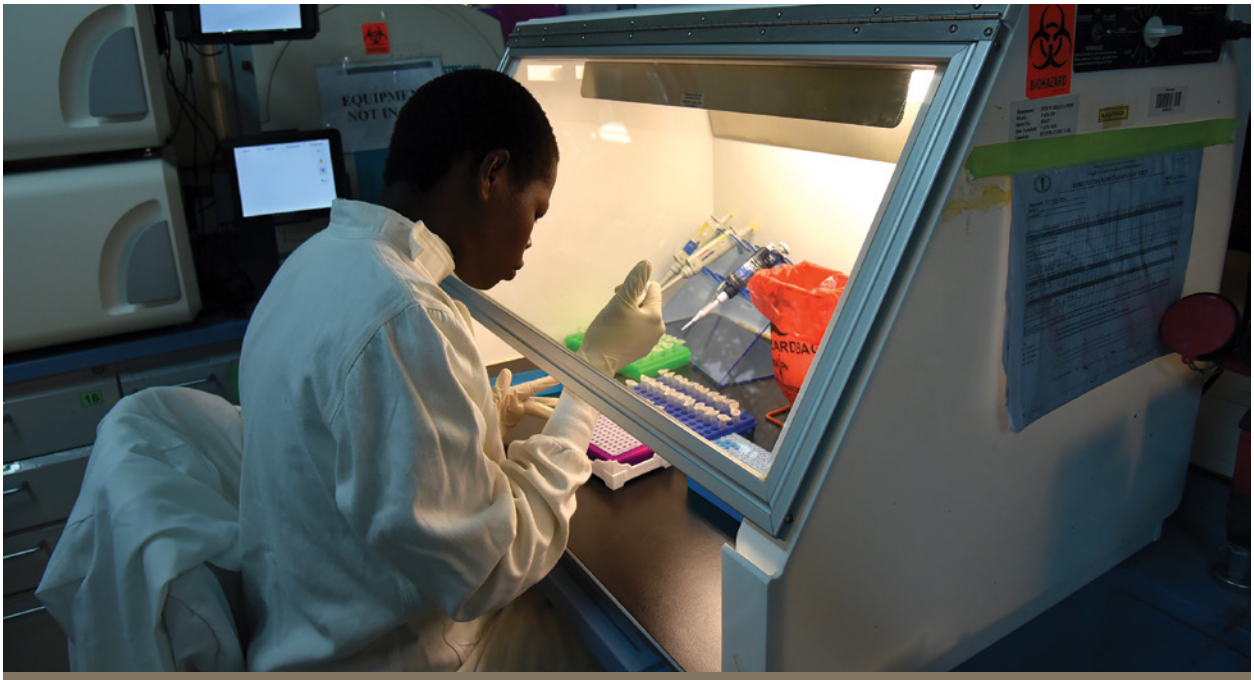
- Allows for ongoing cough monitoring rather than infrequent self-reporting of symptoms,
- Proves to be cheaper than periodic screening,
- Identifies more new cases, and
- Minimally disrupts prison operations

When comparing active case finding to periodic TB screening, the number of TB cases identified in the pilot sites increased by more than 60% compared to a reported decrease in the identification of new TB cases in the non-pilot sites. Based on the success of the pilot, plans are underway to fully implement active case finding in all of Kenya's 108 prisons in 2018. The success of this effort demonstrates that CDC Kenya is ensuring that science is not only delivered, but that it is applied.

Number of TB cases among inmates in active case finding (ACF) prisons, Kenya 2016–2017



Strengthening Laboratory Systems in Kenya



Laboratorian working under a biosafety cabinet while preparing samples for analysis. Photo credit: Justin Williams

CDC Kenya works to strengthen laboratories and support diagnostic capacity, appropriate specimen-handling, quality assurance systems, and adequate biosafety standards both in Kenya and across the region. In 2017, CDC Kenya supported laboratories responded to 57 outbreaks, of which 40 received laboratory support and 30 yielded a confirmed laboratory diagnosis which identified the pathogen cause, including influenza virus, *Vibrio cholerae*, hepatitis A virus, Chikungunya virus, and dengue virus. Other causes were rabies virus, *Aeromonas hydrophilia*, Salmonella, *Bacillus anthraces*, and measles virus.

Establishing Laboratory Systems in Refugee Camps

In northwestern Kenya, the Kakuma camp is home to over 160,000 refugees from over 18 countries. Infectious disease threats are of critical concern within the refugee population because an outbreak in Kakuma could quickly overwhelm health systems in the region if allowed to spread. A lack of a functional laboratory in Kakuma has hampered the ability of clinicians to determine causes of common diseases and manage them in a timely manner. Some of the refugees in Kakuma are admitted to the United States Refugee Admissions Program. This makes Kakuma a significant target for health protection of the American public, which can be achieved by improving laboratory capacity in the camp.

To address this issue, CDC Kenya together with other collaborative partners in 2017 supported the International Rescue Committee (IRC) efforts in building a laboratory and providing equipment to the Kakuma camp's General Hospital. Laboratory staff were also trained to test blood and stool samples for infectious diseases. As a result, the turnaround time for receiving lab results reduced from 14 to 5 days because of the ability to test specimens onsite. With these investments, health officials can quickly identify and respond to disease threats in the camp.

Ensuring Access to Laboratory Services in Rural Areas

Another example of CDC Kenya's health system strengthening improvements were seen at the Lodwar County Referral Hospital (CRH). In the rural areas of Turkana County, Lodwar CRH serves Kenyans as well as the Kakuma Refugee Camp. Despite the large population, the Lodwar CRH offered minimal laboratory services. CDC Kenya through a public-private-partnership and with other PEPFAR partners improved the quality of laboratory services and expanded the menu of available tests. This was accomplished through mentorship focused on laboratory quality systems management mentorship, training and the creation of platforms for stakeholder engagement. The population of Turkana County and those in the surrounding area now have access to quality laboratory services, which serves a key factor in ensuring that they receive accurate and timely disease detection and management.

Ensuring Quality Care Begins with Ensuring Reliable Biomedical Equipment

An improperly calibrated pipette could set the course for HIV misdiagnosis, leading to psychological trauma and the unnecessary use of medication. Laboratory equipment management is an essential element in providing quality diagnosis. However, in many parts of Kenya, preventive and corrective equipment maintenance remains poor due to a lack of qualified biomedical engineering personnel, expensive service technicians, and limited training opportunities. Improperly maintained laboratory equipment can result in:

- Diminished effectiveness of new technologies,
- Failure to meet accreditation standards, and
- A higher probability of inaccurate test results thereby compromising the quality of care to patients.

To address the challenges resulting from equipment breakdown, CDC Kenya (through PEPFAR support) collaborated with the MOH, the Association of Public Health Laboratories, and the American International Health Alliance to deliver a series of hands-on equipment maintenance and calibration training to local MOH engineers. Thirty MOH engineers from across the country and the National Public Health Laboratory were selected for this intensive training.

The engineers participated in two separate week-long courses and learned to properly diagnose and troubleshoot equipment issues, repair them and provide continuous preventive maintenance. The engineers were also provided with an advanced equipment service toolkit. Following the training, the trainees received technical assistance and mentorship at their assigned sites to reinforce their newly acquired skills.

By ensuring the reliability of laboratory equipment, CDC Kenya's support builds the capacity of local engineers and helps create a sustainable health system. These engineers now take pride that their work directly supports Kenya's population in knowing and trusting their HIV status.

Small Investments in Infrastructure Lead to Better Care

When one thinks of health information technology (IT)—one may also think of high costs, specialized equipment and infrastructure development. However, large financial investments in health IT are not always necessary to improve clinical care efficiency. In the absence of a laptop, internet and modem, the St. Monica health facility in Migori County relied on paper-based mail to get viral load results for its patients. This led to delays in getting timely and critical information in the hands of the clinicians for decision-making and challenges with reviewing aggregate data at the facility level, which ultimately compromised the quality of care.

Through the support of PEPFAR funding, the St. Monica health facility purchased a $200 laptop, a $30 modem and a monthly $10 data bundle. These investments allow staff to log into the national viral load website and download laboratory results in real-time. Laboratory staff receive text messages seven days a week that results are ready for retrieval. With these improvements:

- Samples tracking was simplified,
- Samples and results are easily matched,
- Efficiency improved by decreasing the number of staff involved, and
- Results are imported into patients' electronic medical records (where available).

It used to take up to 21 days to receive viral load and early infant diagnosis results, but now the turn-around-time is 3 to 5 days—a four-fold reduction. As demonstrated at St. Monica, small investments in infrastructure can have a big impact, thereby supporting timely and clinical decision making and ultimately patient outcomes.

Staff Reflections…

Bernard Warui—CDC Kenya Senior Business Systems Analyst

"As part of the CDC team I am motivated by the possibility to see the impact we make and the lives we touch through our work. Every time I visit the field and see the smiles from our project beneficiaries, I am encouraged that I have made a contribution to that smile. My vision for my area of work is to support our partners in developing strong business systems that adequately address emerging challenges in internal controls and ensure that programmatic objectives are achieved."

Bernard was awarded the CDC Kenya Power of One Quarterly Award in January 2017 for his **'Outstanding contribution to building CDC Kenya partner organizations' capacity through business systems assessment.'**

Expanding the Kenya Public Health Workforce

In 2017, the Kenya FELTP continued making substantial strides through accreditation from the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). The Kenya program joined the ranks of other globally accredited programs (the United States' Epidemic Intelligence Service, and the national FETPs in Canada and the UK). The Kenya FELTP, along with Brazil and Cameroon, were the three programs globally to receive TEPHINET accreditation this year.

The Kenya FELTP has fully implemented the pyramid approach since 2015 to build field capacity in Kenya. This approach includes training epidemiologists within the MoH at the national and sub-national level over three tiers: frontline, intermediate and advanced. Kenya recruited 20 advanced-level residents into the 14th Kenya FELTP cohort in 2017—with the majority of participants joining from county governments.

All Kenya FELTP advanced-level residents take part in classroom education as part of a 2-year Masters of Science degree program offered through Moi University. Like all accredited FETPs, 25% of residents' time is spent in the classroom, while 75% is spent in the field participating in outbreak investigations, leading human and animal disease surveillance activities, and evaluating public health systems.

The FETP style of training by service and field experience has been identified by the Food and Agriculture Organization (FAO) and partners as a successful model in globally expanding the veterinary workforce in conjunction with a One Health approach.

Between 2004 to 2017, Kenya FELTP trained:

209 advanced-level residents (181 medical personnel and 28 veterinarians).

95 Intermediate participants (80 medical personnel and 15 veterinarians).

548 Frontline participants (482 medical personnel and 66 veterinarians).

Helping Counties Improve Immunization Systems through Mentorship

In 1999, CDC in collaboration with WHO launched the Stop Transmission of Polio—STOP program—to train and mobilize teams to provide technical assistance to polio-endemic countries. Since then the STOP Program has deployed more than 2,000 experts to more than 75 countries. STOP participants work with local ministries of health, WHO, and UNICEF to support the global polio eradication efforts by improving vaccine preventable disease surveillance, routine immunizations, outbreak response, communications, social mobilization, and data management in at-risk countries. By 2016, the annual incidence of polio had decreased by >99.9% and the STOP program expanded its services to address measles and rubella elimination, data management and quality, and strengthening routine immunization programs.

High quality data are needed for evidence-based decision making to improve routine immunization practices and service delivery. Based on the successes of the STOP program, Kenya became one of the first three international sites to pilot a new program, STOP Immunization and Surveillance Data Specialists (ISDS), which

allows participants to work collaboratively with public health officials at the local level to identify specific data related challenges and create sustainable solutions. The primary focus of the STOP ISDS strategy is to improve knowledge, skills, and practices through the routine management and use of disease surveillance data. The STOP ISDS provided technical support to improve data quality in 25 sub-counties and 160 health facilities in five targeted counties.

A second program, the Strengthening Technical Assistance for Routine Immunization Training project—better known as START—was launched in Kenya to improve the Expanded Program on Immunization (EPI) planning, monitoring, and service delivery through building capacity of sub-national EPI staff. START focuses on mentoring EPI staff from the health facilities up to county health officials using strategies of on-the-job training.

Together, these two programs have reached 200 health facilities located throughout 19 of Kenya's 47 counties. Both programs note an increase in staff morale as well as improved performance through routine feedback on immunization, disease surveillance data as well as weekly reporting.

Key Outcomes in the Fight against HIV and TB

HIV Care and Treatment

Program Outcomes	CDC Kenya supported sites	% of Target Reached[1]
# of HIV testing and counseling sessions performed with results received by client	7,641,637	148%
# of adults and children currently on ART	683,329	87.5%
# of pregnant women who know their HIV status	327,510	75%
# of HIV positive pregnant women who received antiretroviral prophylaxis to reduce risk of mother-to-child transmission of HIV	27,255	67%
# of TB/HIV co-infected patients in TB clinics who received ART	10,247	77%
% of viral load tests with an undetectable viral load (<1000 copies/ml)	442,370	72%

HIV Prevention

Program Outcomes	CDC Kenya supported sites	% of Target Reached[1]
# of males who have received voluntary male medical circumcision services	150,000	91%
# of key populations that received evidence-based HIV prevention interventions	163,522	108%
# of people who inject drugs on medication-assisted therapy for at least 6 months	6,208	87%

Health System Strengthening and Capacity Building

Program Outcomes	CDC Kenya supported sites	% of Target Reached[1]
# of Site Improvement through Monitoring Systems site visits conducted	340	91%
% of CDC supported laboratories that directly contributed to viral load (VL) tests	Almost 70% (of the 1 million VL tests conducted)	
% of laboratories that attained 2 SLIPTA[2] stars or higher, by the end of the Rapid Results Initiative[3]	85%	
% change in annual production of proficiency testing panels[4] for rapid HIV testing	> 200% (from 9,000 to 19,000)	

**Data reflect annual results through September 30, 2017 (end of FY 2017)

[1] In instances where the percentage is greater than 100%, then the set program target was exceeded.

[2] SLIPTA (Stepwise Laboratory Quality Improvement process towards Accreditation) supports the implementation of quality management systems in medical laboratories that help them meet international accreditation standards. The SLIPTA framework uses a star-rating system to demonstrate progression.

[3] 100-day Rapid Results Initiative assists laboratories going through accreditation in Kenya, with the aim of fast tracking them to full accreditation status

[4] Proficiency testing panels are samples of known status (HIV positive or negative) sent out by the reference laboratory to continually verify the competency of testers.

Transforming Waste to Fuel and Creating Healthier Communities

Globally, 6 in 10 people (or 4.5 billion) lack safely managed sanitation. This puts people, especially children, at risk of diarrheal illness including cholera, dysentery, and typhoid fever. In Kenya, open defecation remains a major public health problem with 95% of human fecal waste released and untreated into the environment. In early 2017, the Government of Kenya launched a campaign to eliminate open defecation by 2020. In support of this effort, CDC staff in Atlanta and Kenya are collaborating with a local non-governmental organization, Sanivation, to improve water, sanitation and hygiene in Kenya one briquette at a time.

Briquette?

That's right! Sanivation uses innovative low-cost solar treatment technologies to transform fecal waste into briquettes that can be sold and used as a smell-free fuel source for cooking or heating. Another key component of Sanivation's program is the provision of in-home, urine-diverting container-based toilets. Recipients are charged a nominal subscription fee to have toilet service representatives come to their homes and empty the containers. High heat from concentrated sunlight renders the waste safe. It is then mixed with charcoal dust and pressed into perfectly formed briquettes.

This approach to managing waste is low-cost and generates income making the system sustainable. It works better, faster, and costs less than traditional wastewater treatment. The briquettes burn more cleanly than wood or charcoal and reduces the demand for charcoal and wood for cooking and heating, helping to protect the environment.

CDC Kenya and CDC's Waterborne Disease Prevention Branch are evaluating Sanivation's work through a CDC Innovation Fund (iFund) Award and helping to scale-up their waste collection and treatment activities beyond its current household subscribers.

In 2017, CDC Kenya and the Waterborne Disease Prevention Branch received another iFund award to evaluate a clean water program in the largest informal settlement in East Africa. Partnering with Shining Hope for Communities (SHOFCO), CDC will complete a comprehensive evaluation of the aerial "Skywater" system in 2018, including water collection and sampling for safety.

One of the urine-diverting latrines provided by Sanivation which captures human waste to later be converted into briquettes. Photo credit: Sanivation

Staff Reflections…

Sylvia Kataike—Office Manager

"Team Spirit in CDC is great! When I joined CDC I did not know the systems and I was not really sure if I would meet the expectations of my supervisor, branch members, division and CDC as a whole. But the team I found, tirelessly supported me through the learning process and before I knew, it became part… of my "DNA." Having leadership that is supportive, empowering and believes in you makes a whole difference. By the time I leave CDC or move to the next level my goal is that Division of Global HIV/AIDS and TB should be operating efficiently and effectively with clear systems and policies in place."

Sylvia was awarded the CDC Kenya Power of One Quarterly Award in July 2017 for her **'Outstanding individual commitment towards efficient administrative operations.'**

Celebrating the Promise and Potential of HIV-exposed Infants

One of the young children who is HIV negative thanks to the life-saving treatment provided by the Makueni County Referral Hospital. Photo: Justin Williams

"In September 2010 [I was] happily pregnant with my second born…The nurse at the antenatal clinic offered to test me for HIV and I obliged…HIV was never meant for people like me—or so I thought. Within 15 minutes my world view and status had changed, as I was declared HIV positive." These are the words of Mary, who recounts her struggles and inspiring

story of being a pregnant woman who was HIV-positive and yet committed to ensuring that her child would remain HIV-negative. Mary shared her story during a graduation ceremony for Makueni County Referral Hospital's HIV-exposed infants in front of an audience that included officials from Makueni County and the U.S. Ambassador to Kenya, Robert Godec.

In 2017, the Makueni County Referral Hospital celebrated achieving virtual elimination of mother-to-child transmission of HIV. Since 2011, the program has served 290 HIV-exposed infants and only 5 have tested HIV-positive—a rate of 1.7%—at 18-months. On this day, Ambassador Godec congratulated the women stating, "The American people continue to stand alongside Kenya as we strive towards maximizing resources in order to reach more lives, save more babies, and experience an HIV-free generation…Today we celebrate you and your children's promise towards a healthier future."

For more than a decade, PEFPAR, through the CDC, has been working in partnership with the Makueni County government to strengthen health systems. CDC Kenya has provided more than $10.5 million to Makueni County, and in partnership with the Centre for Health Solutions, supports more than 70 health facilities and 172 health care workers.

In Makueni County, more than 22,000 adults and approximately 3,400 children (under age of 15) are living with HIV. CDC Kenya supports treatment for nearly 15,000 patients, including 1,600 children. Since October 2015, transmission of HIV from infected mothers to infants has been at 0%. The facility is on course to virtual elimination of mother-to-child transmission—one of the ultimate goals in HIV prevention.

As other CDC-supported programs, similar to those in Makueni County, work towards achieving elimination of mother-to-child transmission, it becomes increasingly evident that Mary's lasting words are well within reach and that through the "...heroines with us here and their beautiful children graduating today… together we can!"

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Appendix: Explanation of Figures for Accessibility

Map: HIV CBS pilot data from 124 facilities in two high HIV-burden counties in Western Kenya. Shows the map of CBS pilot sub-counties within Siaya (purple) and Kisumu (green) counties, along with 124 facilities in which the CBS pilot was done. The 124 facilities fall within Siaya and Kisumu health demographic surveillance systems (HDSS). The red points represent the 124 facilities with corresponding size indicating case counts in each facility. The counties border Lake Victoria in Western Kenya where HIV burden is highest in the country.

Line Graph: Number of TB cases among inmates in active case finding (ACF) prisons, Kenya 2016–2017. Using a line graph, the number of TB cases identified in 10 active-case finding prison sites versus non-active case finding sites from quarter 3 of 2015 to quarter 4 of 2017 are plotted. The y-axis depicts the number of cases and the x-axis depicts the time period in which the cases were identified in both groups. The illustration shows that the number of TB cases in the ACF sites in quarter 3 of 2015 (prior to the implementation of the ACF pilot project) were lower (N=65) than the non-ACF sites (N=97). Once the ACF pilot was implemented (between quarter 3 and 4 of 2016), then the number of TB cases in the ACF sites increased (N=92) and eventually surpassed the number of TB cases identified in the non-ACF sites (N=75).

Notes:

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